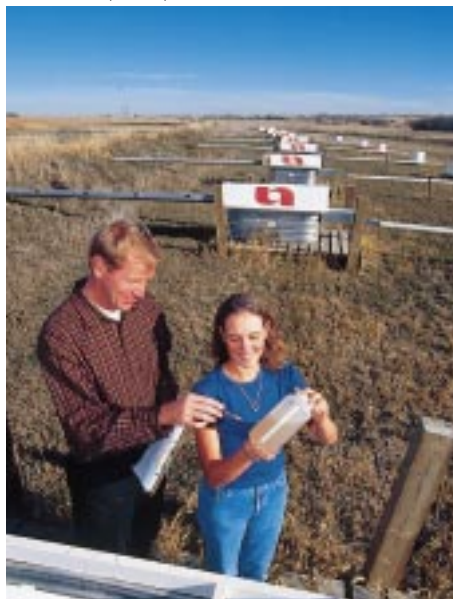


SCOTT BAUER (K8699-1)



Soil scientist Brian Wienhold and technician Julie Paschold examine a runoff sample collected from plots on which nitrogen and phosphorus losses are studied. The plots received swine manure differing in phosphorous content.

“While the MSEA program has used new technology like the TDR unit and the chlorophyll meter, many of the practices in the successful ridge tillage system are not new. What is new about this program is that it packages practices together into systems that work, protecting water quality and growing crops,” Dowdy says.

The same is true for all the sites in the environmental quality program.—By **Don Comis**, ARS.

This research is part of Water Quality and Management (#201) and Soil Resource Management (#202), ARS National Programs described on the World Wide Web at <http://www.nps.ars.usda.gov/programs/nrsas.htm>.

Scientists mentioned in this story can be contacted through Don Comis, 5601 Sunnyside Ave., Beltsville, MD 20705-5129; phone (301) 504-1625, fax (301) 504-1641, e-mail dcomis@asrr.arsusda.gov. ♦

Corn Seed Pretreatment Reduces Fusarium

Finding kinder, gentler microbial friends for corn plants has led to a strategy for controlling a fungal toxin—even before the crop is planted.

The fungus, *Fusarium moniliforme*, is especially dangerous if it gets into corn fed to horses or swine, says ARS microbiologist Charles W. Bacon. While contamination with the fumonisin toxin produced by *F. moniliforme* is rare in the United States, the Food and Drug Administration established tolerance—or maximum allowable—levels as a precaution in early 1999.

Bacon heads the Toxicology and Mycotoxin Research Unit in Athens, Georgia. He and fellow microbiologist Dorothy M. Hinton found a safe, convenient way to prevent corn contamination from the moment the seedlings come up. They began working on the project in 1996.

Now a company is developing a seed treatment with a harmless natural bacterium that suppresses *F. moniliforme*. Farmers may have access to the treatment in a year or two, pending final field tests.

Fusarium thrives inside corn plants, dwelling in spaces between the cells. And one obstacle to removing it has been that many isolates actually benefit the plants.

“While the fungus is bad news for mammals, we found that most strains of it seem to help improve corn root growth,” says Bacon. “This better enables the plant to survive dry conditions and related stress. What we’ve done is substitute a bacterium that is harmless to both plants and animals.”

Last year, Bacon and Hinton found that a strain of *Bacillus subtilis* fills up corn’s intercellular spaces before *F. moniliforme* gets the opportunity. Scientists call this competitive exclusion.

And the *B. subtilis* wants the plant all to itself. In petri dishes, it actually repelled *F. moniliforme* and may do more for plants’ roots than *Fusarium* does. The helpful *B. subtilis* has shown promise not only in the lab but also in greenhouses and small-scale field plots in Georgia and Iowa.

Bacon and Hinton filed a patent on the technology, which caught the eye of Donald S. Kenney, director of technology for Gustafson LLC, a seed treatment company in Plano, Texas.

“To control fungal toxins in an ear of corn through a seed treatment is especially interesting to us,” says Kenney. “You’re protecting the harvest by doing something far upstream, before the farmer even buys the seed.”

Scientists have found other strains of *B. subtilis* that prevent corn from being contaminated with *Fusarium*. But the growing plants would have to be “vaccinated” with the microorganism through sprays or other treatments. And that’s impractical for farmers.

However, seed treatments are very practical. “We use a fermentation process to stabilize the bacteria and increase concentrations,” says Gustafson plant pathologist Philip Brannen. “Seed companies would buy the product from us in a liquid or dried form.”

Another benefit is the product’s stability. Corn seed sellers get about 10 percent of their product returned from retailers each year, says Kenney. Pretreated seed may have to be stored a year before it can be resold. The treatment seems to last at least 2 years, which is plenty of time for resale.—By **Jill Lee**, formerly with ARS.

This research is part of Food Safety, an ARS National Program (#108) described on the World Wide Web at <http://www.nps.ars.usda.gov/programs/appvs.htm>.

Charles Bacon is in the USDA-ARS Toxicology and Mycotoxin Research Unit, Richard B. Russell Research Center, 934 College Station Rd., Athens, GA 30605; phone (706) 546-3158, fax (706) 546-3116, e-mail mewborns@ars.usda.gov. ♦